Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A method of recovering data in a wireless communication system, comprising:

obtaining prior information for channel gain and interference;

deriving forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain and interference;

decoding the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

deriving a posteriori information for channel gain and interference for each of the received data symbols based on the feedback information for the code bits corresponding to the received data symbol; and

combining the a posteriori information for channel gain and interference for the received data symbols and the prior information for channel gain and interference to obtain updated information for channel gain and interference for each of the received data symbols.

2. (Original) The method of claim 1, further comprising:

repeating the deriving forward information for at least one additional iteration based on the updated information for channel gain and interference.

3. (Original) The method of claim 1, further comprising:

repeating the deriving forward information, decoding the forward information, deriving a posteriori information, and combining the a posteriori information and the prior information for a plurality of iterations, and wherein the forward information is derived based on the prior information for channel gain and interference for first iteration and based on the updated information for channel gain and interference for each subsequent iteration.

4. (Original) The method of claim 1, wherein the forward and feedback information for the code bits corresponding to each received data symbol is represented by log-likelihood ratios (LLRs) for the code bits.

5. (Original) The method of claim 1, wherein the prior information for channel gain and interference, the a posteriori information for channel gain and interference for each received data symbol, and the updated information for channel gain and interference for each received data symbol are each represented by a joint probability distribution on channel gain and interference.

6. (Original) The method of claim 1, wherein each joint probability distribution is quantized to a predetermined number of values to reduce complexity.

7. (Original) The method of claim 1, wherein the predetermined number of values are selected based on points with maximum probability in the joint probability distribution.

8. (Original) The method of claim 1, wherein the predetermined number of values is reduced for each subsequent iteration of the deriving forward information, decoding the forward

information, deriving a posteriori information, and combining the a posteriori information and the prior information.

9. (Original) The method of claim 1, wherein the updated information for channel gain and interference for each received data symbol is obtained by combining the prior information for channel gain and interference and the a posteriori information for channel gain and interference for other ones of the received data symbols.

10. (Original) The method of claim 1, wherein the prior information for channel gain and interference is obtained based on received pilot symbols.

11. (Original) The method of claim 1, wherein the channel gain is composed of channel magnitude and channel phase, wherein the channel magnitude is determined non-iteratively, and wherein prior information, a posteriori information, and updated information are obtained for channel phase and interference.

12. (Original) A receiver in a wireless communication system, comprising:
a detector operative to obtain prior information for channel gain and interference and derive forward information for code bits corresponding to received data symbols; and
a decoder operative to decode the forward information and provide feedback information for the code bits corresponding to the received data symbols, and
wherein the detector is further operative to derive updated information for channel gain and interference using the feedback information, and wherein the detector and the decoder are operative to exchange forward and feedback information for a plurality of iterations.

13. (Original) The receiver of claim 12, wherein the detector is an a posteriori probability (APP) detector.

14. (Original) The receiver of claim 12, wherein the detector further uses the received data symbols and received pilot symbols to derive the updated information for channel gain and interference.

15. (Original) The receiver of claim 12, wherein the forward and feedback information is represented by log-likelihood ratios (LLRs) for the code bits corresponding to the received data symbols.

16. (Original) A receiver in a wireless communication system, comprising:

an estimator operative to obtain prior information for channel gain and interference;

a detector operative to derive forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain and interference; and

a decoder operative to decode the forward information to obtain feedback information for the code bits corresponding to the received data symbols, and

wherein the estimator is further operative to derive a posteriori information for channel gain and interference for each of the received data symbols based on the feedback information for the code bits corresponding to the received data symbol and to combine the a posteriori information for channel gain and interference for the received data symbols and the prior information for

channel gain and interference to obtain updated information for channel gain and interference for each of the received data symbols.

17. (Original) The receiver of claim 16, wherein the estimator, detector, and decoder are operative to derive forward information, decode the forward information, derive a posteriori information, and combine the a posteriori information and the prior information for a plurality of iterations, and wherein the detector is operative to derive the forward information based on the prior information for channel gain and interference for first iteration and based on the updated information for channel gain and interference for each subsequent iteration.

18. (Original) The receiver of claim 16, wherein the wireless communication system is an orthogonal frequency division multiplexing (OFDM) communication system.

19. (Original) The receiver of claim 16, wherein the wireless communication system is a frequency hopping communication system.

20. (Original) An apparatus in a wireless communication system, comprising:
means for obtaining prior information for channel gain and interference;
means for deriving forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain and interference;
means for decoding the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

means for deriving a posteriori information for channel gain and interference for each of the received data symbols based on the feedback information for the code bits corresponding to the received data symbol; and

means for combining the a posteriori information for channel gain and interference for the received data symbols and the prior information for channel gain and interference to obtain updated information for channel gain and interference for each of the received data symbols.

21. (Original) The apparatus of claim 20, further comprising:

means for repeating the deriving forward information, decoding the forward information, deriving a posteriori information, and combining the a posteriori information and the prior information for a plurality of iterations, and wherein the forward information is derived based on the prior information for channel gain and interference for first iteration and based on the updated information for channel gain and interference for each subsequent iteration.

22. (Original) A processor readable media for storing instructions operable to:

obtain prior information for channel gain and interference;

derive forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain and interference;

decode the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

derive a posteriori information for channel gain and interference for each of the received data symbols based on the feedback information for the code bits corresponding to the received data symbol; and

combine the a posteriori information for channel gain and interference for the received data symbols and the prior information for channel gain and interference to obtain updated information for channel gain and interference for each of the received data symbols.

23. (Original) The processor readable media of claim 22, wherein the instructions is further operable to:

repeat derive forward information, decode the forward information, derive a posteriori information, and combine the a posteriori information and the prior information for a plurality of iterations, and wherein the forward information is derived based on the prior information for channel gain and interference for first iteration and based on the updated information for channel gain and interference for each subsequent iteration.

24. (Original) A method of recovering data in a wireless communication system, comprising:

obtaining prior information for channel gain and interference based on received pilot symbols;

computing forward log-likelihood ratios (LLRs) for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain and interference;

decoding the forward LLRs for the code bits to obtain feedback LLRs for the code bits;

deriving a posteriori information for channel gain and interference for each of the received data symbols based on the feedback LLRs for the code bits of the received data symbol; and

combining the a posteriori information for channel gain and interference for the received data symbols and the prior information for channel gain and interference to obtain updated information for channel gain and interference for each of the received data symbols.

25. (Original) The method of claim 24, further comprising:

repeating the computing forward LLRs, decoding the forward LLRs, deriving a posteriori information, and combining the a posteriori information and the prior information for a plurality of iterations, and wherein the forward LLRs are computed based on the prior information for channel gain and interference for first iteration and based on the updated information for channel gain and interference for each subsequent iteration.

26. (Original) The method of claim 24, wherein the channel gain is composed of channel magnitude and channel phase, wherein the channel magnitude is determined non-iteratively, and wherein prior information, a posteriori information, and updated information are obtained for channel phase and interference.

27. (Original) The method of claim 26, wherein the obtaining prior information for channel phase and interference includes

computing a joint probability distribution on channel phase and interference for each of at least one received pilot symbol, and

combining at least one joint probability distribution on channel phase and interference for the at least one received pilot symbol to obtain a composite joint probability distribution on channel phase and interference, wherein the prior information for channel phase and interference comprises the composite joint probability distribution on channel phase and interference.

28. (Original) The method of claim 24, wherein the computing forward LLRs for each of the received data symbols includes

computing a probability distribution on data symbol value x based on the received data symbol and a joint probability distribution on channel phase and interference for the received data symbol, and

deriving the forward LLRs for code bits of the received data symbol based on the probability distribution on x.

29. (Original) The method of claim 24, wherein the decoding is performed with a maximum a posteriori (MAP) decoder or a soft-output Viterbi (SOV) decoder.

30. (Original) The method of claim 24, wherein the decoding is performed with one or more iterations of a Turbo decoder or a low density parity check (LDPC) decoder.

31. (Original) A method of recovering data in a wireless communication system, comprising:

obtaining prior information for channel gain;

obtaining an interference estimate;

deriving forward information for code bits corresponding to received data symbols based on the received data symbols, the prior information for channel gain, and the interference estimate;

decoding the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

deriving a posteriori information for channel gain for each of the received data symbols based on the interference estimate and the feedback information for the code bits corresponding to the received data symbol; and

combining the a posteriori information for channel gain for the received data symbols and the prior information for channel gain to obtain updated information for channel gain for each of the received data symbols.

32. (Original) The method of claim 31, further comprising:

repeating the deriving forward information, decoding the forward information, deriving a posteriori information, and combining the a posteriori information and the prior information for a plurality of iterations, and wherein the forward information is derived based on the prior information for channel gain for first iteration and based on the updated information for channel gain for each subsequent iteration.

33. (Original) The method of claim 31, wherein the forward and feedback information for the code bits corresponding to each received data symbol is represented by log-likelihood ratios (LLRs) for the code bits.

34. (Original) The method of claim 31, wherein the prior information for channel gain, the a posteriori information for channel gain for each received data symbol, and the updated information for channel gain for each received data symbol are each represented by a probability distribution on channel gain.

35. (Original) The method of claim 31, wherein the prior information for channel gain and the interference estimate are obtained based on received pilot symbols.

36. (Original) The method of claim 31, wherein the channel gain is composed of channel magnitude and channel phase, wherein the channel magnitude is determined non-iteratively, and wherein the prior information, the a posteriori information, and the updated information are obtained for channel phase.

37. (Original) The method of claim 31, wherein the prior information for channel gain and the interference estimate are obtained by

computing a joint probability distribution on channel phase and interference based on at least one received pilot symbol,

deriving a probability distribution on channel phase and a probability distribution on interference based on the joint probability distribution on channel phase and interference, wherein the prior information for channel phase comprises the probability distribution on channel phase, and

obtaining the interference estimate based on the distribution on interference.

38. (Original) A receiver in a wireless communication system, comprising:

an estimator operative to derive prior information for channel gain and an interference estimate;

a detector operative to derive forward information for code bits corresponding to received data symbols based on the received data symbols, the prior information for channel gain, and the interference estimate; and

a decoder operative to decode the forward information to obtain feedback information for the code bits corresponding to the received data symbols, and

wherein the estimator is further operative to derive a posteriori information for channel gain for each of the received data symbols based on the interference estimate and the feedback information for the code bits corresponding to the received data symbol and to combine the a

posteriori information for channel gain for the received data symbols and the prior information for channel gain to obtain updated information for channel gain for each of the received data symbols.

39. (Original) The receiver of claim 38, wherein the estimator, detector, and decoder are operative to derive forward information, decode the forward information, derive a posteriori information, and combine the a posteriori information and the prior information for a plurality of iterations, and wherein the detector is operative to derive the forward information based on the prior information for channel gain for first iteration and based on the updated information for channel gain for each subsequent iteration.

40. (Original) An apparatus in a wireless communication system, comprising:

means for obtaining prior information for channel gain;

means for obtaining an interference estimate;

means for deriving forward information for code bits corresponding to received data symbols based on the received data symbols, the prior information for channel gain, and the interference estimate;

means for decoding the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

means for deriving a posteriori information for channel gain for each of the received data symbols based on the interference estimate and the feedback information for the code bits corresponding to the received data symbol; and

means for combining the a posteriori information for channel gain for the received data symbols and the prior information for channel gain to obtain updated information for channel gain for each of the received data symbols.

41. (Original) The apparatus of claim 40, further comprising:

means for repeating the deriving forward information, decoding the forward information, deriving a posteriori information, and combining the a posteriori information and the prior information for a plurality of iterations, and wherein the forward information is derived based on the prior information for channel gain for first iteration and based on the updated information for channel gain for each subsequent iteration.

42. (Withdrawn) A method of performing channel phase estimation in a wireless communication system, comprising:

performing non-iterative estimation of channel phase based on received symbols to obtain a set of hypothesis for the channel phase, wherein the set of hypothesis is a subset of all possible hypothesis for the channel phase; and

performing iterative data-directed estimation of the channel phase based on the set of hypothesis and received data symbols to obtain a final channel phase estimate selected from among the set of hypothesis.

43. (Withdrawn) The method of claim 42, wherein the set of M hypothesis includes M phases separated by 2□/M for an M-ary phase shift keying (PSK) modulation scheme used for the received data symbols.

44. (Withdrawn) The method of claim 42, further comprising:

performing iterative detection and decoding for the received data symbols using the set of hypothesis for the channel phase.

45. (Original) A method of recovering data in a wireless communication system, comprising:

obtaining a channel phase estimate based on received symbols;

obtaining prior information for channel gain based on received pilot symbols and the channel phase estimate;

deriving forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain;

decoding the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

deriving a posteriori information for channel gain for each of the received data symbols based on the channel phase estimate and the feedback information for the code bits corresponding to the received data symbol; and

combining the a posteriori information for channel gain for the received data symbols and the prior information for channel gain to obtain updated information for channel gain for each of the received data symbols.

46. (Original) The method of claim 45, wherein the channel phase estimate is represented by a set of M hypothesis for channel phase, where M is greater than one.

47. (Original) The method of claim 45, further comprising:

repeating the deriving forward information, decoding the forward information, deriving a posteriori information, and combining the a posteriori information and the prior information for a plurality of iterations, and wherein the forward information is derived based on the prior information for channel gain for first iteration and based on the updated information for channel gain for each subsequent iteration

48. (Original) The method of claim 45, wherein the received data symbols are derived from an M-ary phase shift keying (PSK) modulation scheme, where $M > 2$.

49. (Original) The method of claim 48, wherein the prior information, the a posteriori information, and the updated information each comprise M components of M different channel phase values.

50. (Original) The method of claim 45, wherein the obtaining a channel phase estimate includes

determining phase of each of the received data symbols,

rotating the phase of each of the received data symbols, if necessary, to be within a range of values, and

computing the channel phase estimate based on rotated phases for the received data symbols.

51. (Original) The method of claim 45, wherein the obtaining a channel phase estimate includes

rotating each of the received data symbols, if necessary, so that phase of the rotated received data symbol is within a range of values,

computing an average received data symbol based on the rotated received data symbols, and computing the channel phase estimate based on the average received data symbol.

52. (Original) A receiver in a wireless communication system, comprising:

an estimator operative to obtain a channel phase estimate based on received data symbols and to obtain prior information for channel gain based on received pilot symbols and the channel phase estimate;

a detector operative to derive forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain; and

a decoder operative to decode the forward information to obtain feedback information for the code bits corresponding to the received data symbols, and

wherein the estimator is further operative to derive a posteriori information for channel gain based on the channel phase estimate and the feedback information for the code bits corresponding to the received data symbols and to combine the a posteriori information for channel gain and the prior information for channel gain to obtain updated information for channel gain.

53. (Original) An apparatus in a wireless communication system, comprising:

means for obtaining a channel phase estimate based on received data symbols;

means for obtaining prior information for channel gain based on received pilot symbols and the channel phase estimate;

means for deriving forward information for code bits corresponding to received data symbols based on the received data symbols and the prior information for channel gain;

means for decoding the forward information to obtain feedback information for the code bits corresponding to the received data symbols;

means for deriving a posteriori information for channel gain based on the channel phase estimate and the feedback information for the code bits corresponding to the received data symbols; and

means for combining the a posteriori information for channel gain and the prior information for channel gain to obtain updated information for channel gain.